

Characterization of Picometer Repeatability Displacement Metrology Gauges

Peter G. Halverson, Lawrence S. Azevedo, Rosemary T. Diaz, Robert E. Spero

Jet Propulsion Laboratory, California Institute of Technology
Pasadena, California 91109 U.S.A.

E-mail: *Peter.Halverson@jpl.nasa.gov*

Abstract

The Space Interferometry Mission ("SIM", see <http://sim.jpl.nasa.gov>), scheduled for launch in 2009, is an optical stellar interferometer with a 10 meter baseline capable of micro-arcsecond accuracy astrometry. A mission-enabling technology development program is underway at JPL, including the design and test of interferometer displacement metrology gauges to monitor the geometry of the spacecraft structure and optical components. The gauges are required to have a repeatability of 10 picometers over several meters of motion and roughly 1 millikelvin temperature drifts.

The ~10 picometer (r.m.s.) repeatability displacement measuring interferometers must be tested to (a) guide the development effort and (b) to validate their contributions to the system error budget.

In this paper we describe a test facility designed to evaluate metrology gauge nonlinearity and thermally-induced errors, with sensitivity as small as 10 picometers.